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Proposal of directions for the establishment of loan programs for the promotion of apartment houses maintenance in Korea

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ABSTRACT

Seoul has vast stocks of apartment houses no less than ultra-large cities of the world, but has not made efforts enough for the development of policies to maintain and recycle existing apartment houses by having growth-oriented housing policy like construction of new apartment houses rather than utilizing or re-using existing houses so far. When it has been about 20 years since the apartments in Seoul or the first group of new cities, such as Bundang, Ilsan, etc. were built, requiring remodeling and renovation, loan programs are anticipated to emerge as an important issue for maintenance of the quality, safe utilization and inducement of maintenance of existing houses.

This study aims to propose direction for the establishment of apartment house loan programs in Korea by analyzing the apartment houses maintenance loan programs in New York as a model for establishing the apartment house maintenance loan program systems in Korea, and obtained the following results:

First, through a survey analysis of the apartment house maintenance environment and housing financing policy of the U.S. and New York city, directions for establishing policies of the apartment house maintenance environment and maintenance policy of Korea were examined. Through the examination, the validity and deficiency of the apartment house maintenance of Korea were identified.

Second, through a survey of the subjects, preference contents, application qualifications, and preference conditions of the apartment house maintenance loan programs in New York, the framework of the loan programs of New York was reviewed.

Third, based on the framework of the loan programs of New York, a financing plan for the activation of apartment house maintenance was proposed along with the directions of the loan programs in Korea.

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1. Introduction

1.1. Background and objective

Major countries, such as China, Japan, the U.S., etc., are transitioning from new construction of houses to an era of recycling existing houses by executing green policies. such as energy saving, low carbon materials, etc. In addition, there are growing interests in recycle existing houses safely while maintaining sustainable quality of houses in the social structure of existing house production. Also in Korea, the low carbon green growth was proposed as a national vision in 2008, and interests in sustainable housing development like restriction of reconstruction and redevelopment began to show up throughout the construction market [1,2].

Seoul owns vast stocks of apartment houses no less than ultra large cities of the world, but could not made efforts enough to maintain existing apartment houses and development policies to recycle them rather than utilizing and recycling existing houses [3–6]. As the apartment houses in Seoul and the first generation of new cities, such as Bundang, Ilsan, etc., are approaching 20 years of age since they were constructed, they require remodeling and renovation. Thus, loan programs that can stimulate maintenance of existing apartment houses are anticipated to emerge as an important issue for safe utilization of them.

In the case of New York, recycling of existing house along with new construction is taken as the framework of housing policy and various loan programs are offered to induce sustainable maintenance of vast stocks of houses in order to accomplish policy objective. For the existing apartment houses can be maintained sustainably, such loan programs have been served as fund sources in the fields where commercial financial organizations cannot suitably serve through the low interest and long term fixed type loans. From the world city ranking in the overall evaluation of city economy, political stability, residential conditions, etc., New York city was recognized as the top and its stability of the loan programs is also highly evaluated with respect to the economical and political stability [7,8].

Therefore, the purpose of this study is to propose the direction for the establishment of the apartment house maintenance loan programs in Korea by analyzing the loan programs in New York.

1.2. Research subjects and methodology

This study[1] was based on the analysis of the private apartment house maintenance loan programs supported by the city of New York, the U.S.

[1] The subjects of this study were limited to Seoul in Korea and New York in U.S. City of Seoul and city of New York are defined as the study subjects representing Korea and New York, respectively.

As for study method, relevant organizations were identified as shown in Table 1 through various papers and literature, and the loan programs were deduced through investigating the local areas and interviews with relevant authorities for specific data acquisition and verification. In particular, the apartment house maintenance environment (Section 2) in Korea and the direction of the apartment house maintenance programs in Korea (Section 4) were reflected in this paper through gathering opinions from the experts in governmental organizations, such as the Korean Ministry of Land, Transport and Maritime Affairs, the city of Seoul, and governmental affiliated organizations and research institutes including Korea Housing Finance Corporation, Korea Infrastructure Safety & Technology Corporation, Korea Institute of Construction Technology, Korea Land & Housing Corporation, etc., for utilization in the maintenance loan programs.

Table 1
Loan program survey subjects and interviewed organizations.

Class	New York City	Seoul
Program name	The Participation Loan Program The Participation Loan Program New Partners Programs The Small Buildings Loan Program Home Improvement Program Rehabilitation New Partners Program Article 8A Loan Program Supportive Housing Loan Program Senior Citizen Home Assistance Program	None
Interviewed organization	Department of Building (DOB)	Korean ministry of land, transport and maritime affairs
	Department of Housing Preservation & Development (HPD)	City of Seoul
	CAI (Community Associations Institute)	Korea housing financing corporation
	IREM (Institute of Real Estate Management)	Korea infrastructure safety & technology corporation, Korea land & housing corporation, Korea institute of construction technology, long lifespan apartment houses research group
	NAA (The National Apartment Association)	

1.3. Selection of representative cities

Cities in the world, such as Shanghai, Tokyo, Seoul, New York, etc., which represent each continent, were reviewed and selected as subject cities to which Seoul's maintenance supporting system can be properly applied.

The cities were selected based on the selection criteria, such as political, economical, and social stabilities, house stock scale, income level higher than Seoul (or Korea), prior experiences in maintenance, the presence of loan program, and high-rise evolution, etc.

In Asia, Shanghai and Tokyo were selected as candidate cities based on population[2] (hub cities), New York in North America and London, Berlin, and Paris in Europe were selected, respectively. In Table 2, the world city ranking [9–11] evaluated based on economy, political conditions, and social stability, which are closely related to finance programs shows New York and London are outstanding. Also, in Asia, Tokyo was found to be ahead of Shanghai in terms of population and GDP per capita, the number of households, and the presence of loan program supporting system. In North America, New York was found to be advanced compared with LA and Chicago on population, the number of households, and the high-rise ratio. In the case of Europe, London was found to be ahead of Berlin and Paris on the city scale, the number of households, etc. New York, Tokyo, and London were selected as the candidate cities. However, London was excluded because the ratio of houses of 5 stories or more was 8.5%. It was due to the regulation [12] of height of high-rise buildings for the preservation of historic and aesthetic buildings, thus the ratio of high-rise building of 5 stories or more was less than Tokyo and New York. Tokyo also was evaluated low on the world city ranking, the high-rise buildings ratio, and prior experiences in maintenance [6,13–20].

Therefore, when economical, political, and social stability, prior experiences in maintenance, income level, the city scale, the high-rise buildings ratio, etc. were reviewed broadly, New York city was finally considered as a proper case for comparison to Seoul.

2. Apartment house maintenance environment in Korea and U.S.

2.1. Apartment houses maintenance status

2.1.1. Houses stocks and apartment houses ratio

As shown in Fig. 1, the scale of house stocks in Korea, about 16 million households in 2005, rapidly increased by about 1.7 times compared with the stocks in 1995 (10 years ago) and about 2.6 times compared with the stocks in 1985 (20 years ago). In addition, the portion of apartment houses among the entire houses was big enough and it was 52.4% in 2005. Vacancy rate is also showing a continuous increase from 2.8% in 1995 to 4.6% in 2005. For example, the vacancy rate in Seoul, which was 3313 thousand households in 2005, has been increased by about 3 times compared with 1176 thousand households in 1985.

The houses stock scale in the U.S. was about 124 million households in 2005, which is 7.8 times compared with Korea. Among the entire houses, the portion of apartment houses is low with vacancy rate of 9.8% [3].

The house stock in New York city, 3038 thousand households, was gradually increased from 2868 thousand households in 1999 (or 3005 thousand households in 2002). The vacancy rate marked 9.8% in 2005 [21].

[2] The candidate cities were selected based on population because cities with large population reflect the representativeness and policy of the nation the most.

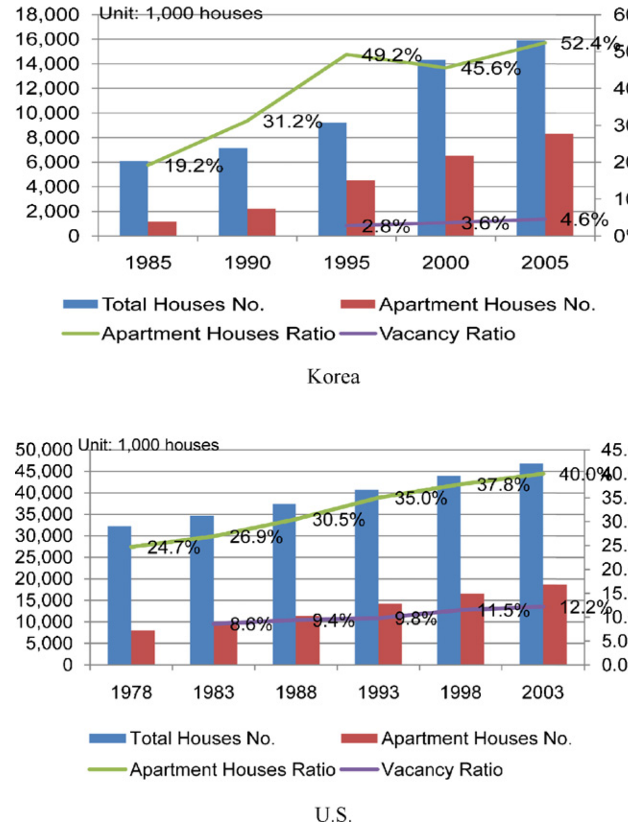


Fig. 1. Ratios and vacancy rates of apartment houses in Korea and U.S.

2.1.2. Portion of high-rise apartment houses in large cities

In view of the portion of apartment houses of 5 stories or more in Table 3, the portion in Seoul was 36.1% in 2005, and particularly the high-rise apartment houses of 15 stories or more was 23.6%, indicating that apartment houses are increasing significantly in height [14–16].

The apartment houses of 5 stories or more and high-rise houses of 20 stories or more in New York City occupied 49.9% and 6.9% in 2005, respectively, which are considered as very high proportions [4].

2.1.3. Ratios of aged householders in large cities

As for the ratios of aged householders in large cities, Table 4 shows Seoul was rapidly increased from 8.4% in 1985 to 16.9% in 2005 [3]. Also, for the birth rate is 1.15 persons, which is the lowest in the world, Seoul is anticipated to face a serious problem of population decrease later on [22]. New York does not have any significant change with 20.5% in 1999 and 19% in 2005. Korea is in a circumstance requiring countermeasures for the significant increase in the number of aged households [4].

2.1.4. Aging degree of apartment houses

In reference to the cumulative ratios of house age from the year of construction completion as shown in Table 5, in Korea the ratio of house age up to 10 years from construction completion was 45.1%, and the ratio up to 20 years and up to 30 years are 79.5% and 94.3%, respectively. It indicates that about 80% of apartment houses were houses up to within 20 years[3] of age, so it implies that maintenance of the aged apartment houses will be urgent matter soon [3].

[3] In Korean literature, repair and replacement periods are set to 5–20 years for the finishing materials like tiles, etc. of building and equipments, and 40 years or more for major structures. On such basis, Choi [53] defines aged apartment house as those

Table 2
Comparison of the maintenance status of world hub cities.

Class	Asia			North America			Europe		
City name	Shanghai	Tokyo	Seoul	**New York**	LA	Chicago	London	Berlin	Paris
World city rank									
GPCI	25th	4th	13th	**1st**	9th	14th	2nd	6th	3rd
WCCI	24th	3rd	9th	**2nd**	17th	5th	1st	23rd	7th
GWC	9th	6th	12th	**1st**	42nd	30th	2nd	–	4th
Area (km^2)	6342	2102	605	**1214**	1290	606	1577	892	87
Population/year	1000/2005	1290/2008	1029/2005	**821/2005**	385/2006	289/2006	736/2006	342/2007	217/2006
GDP ($) per capita	2001	34,188	18,391		39,732		35,616	33,345	32,918
Household No. (ten thousand)	500	543	331	**326**	331	106	319	189	130
House average lifecycle by the country	–	30 years	17 years		66.4 years		–	70 years	36.7 years
Ratio of 5 floors or more	–	31.7%	36.1%	**49.9%**	4%	13.4%	8.5%		
Existence of public loan programs	X	O	X	**O**	O	O	O	O	O
Used houses circulation ratio	–	13.1%	–		77.6%		88.8%	–	66.4%

Note: GPCI, Global Power City Index (30 cities); WCCI, Worldwide Center of Commerce Index (75 cities); GWC, Globalization and World Cities (52 cities).

Table 3
Ratios of mid-high-rise houses in large cities (unit: thousand households, %).

Class	Year	Total	Ratio (%)				5th + floors ratio
			1–4th floors	5–10th floors	11–14th floors*11–19th floors*	15th + floors*20th + floors*	
Seoul	2000	3089	66.8	6.7	5.8	20.8	33.2
	2005	3313	63.9	6.4	6.0	23.6	36.1
New York	2002	3005	50.7	31.1	*11.7*	*6.6*	49.3
	2005	3038	50.1	31.5	*11.4*	*6.9*	49.9

Notes: Seoul: Re-composed with reference to population census, apartments residential environment statistics and houses and cities statistics handbook; New York: New York City Housing and Vacancy Survey, 1999, 2002, and 2005.
Ratios of New York were calculated in classes of 11–19 floors and 20+ floors (italicized).

Table 4
Ratios of aged householders (unit: thousand households, %).

Class	Total households No.	No. of households age 65 +	Ratio
Seoul			
1985	1176	98	8.4
1990	1431	142	9.9
1995	1688	181	10.7
2000	3089	439	14.2
2005	3313	559	16.9
New York			
1999	2868	587	20.5
2002	3005	587	19.5
2005	3038	578	19.0

Note: Seoul: Houses total survey by Statistics Office; New York: New York City Housing and Vacancy Survey, 1999, 2002, and 2005.

Table 5
Cumulative ratios of house age from the year of construction completion (unit: thousand households, %).

Class	Korea				U.S.			
	Nation wide	Ratio	Seoul	Ratio	Nation wide	Ratio	New York	Ratio
Cum No. of houses 70 years	–	–	–	–	124,378	100.0	4,849.7	100
Cum No. of houses 60 years	–	–	–	–	109,701	88.2	4.114.4	84.8
Cum No. of houses 50 years	12,495	100.0	2242	100.0	95,788	77.0	2981.1	615
Cum No. of houses 40 years	12,084	96.7	2224	99.2	67,593	54.3	1737.6	35.8
Cum No. of houses 30 years	11,782	94.3	2185	97.4	42,502	34.2	855.4	17.6
Cum No. of houses 20 years	9928	79.5	1817	81.1	25,182	21.0	519.4	10.7

Note: Korea: Houses total survey by Statistics Office; U.S.: American Housing Survey for the United States 2005, American Housing Survey for the New York City Metropolitan Area in 2003.

of age 20 years or more while discussing the concept of aged apartment house in the research on the aged apartment house recycling policy of Seoul city. Also, Park [54] presented table for the comparison of the repairs and replacement periods of Korean and Japanese architecture societies on the standards of repair and replacement in the research on the apartment house optimum designing methodology based on life cycle cost analysis. In this paper, the repair and replacement period of structures was set to 20–40 years, but that of equipment and finishing materials 5–20 years. Kim and Son [55] were found to set the repair and replacement period to more or less 20 years in the research on the status of building repair and replacement period setting and method to improve it.

In the U.S., the ratio of house aged up to 10 years from new construction was 8.2%, those of up to 40 years and 60 years were 54.3% and 88.2%, respectively. It implies that the houses were used for a long period [21].

2.1.5. Summarized opinion

Seoul's tremendous stock of houses are 3313 thousand households (2005), which is more than New York that has 3038 thousand households (2005). In particular, for the ratio of apartment houses of 5 stories or more in Seoul is 36.1% while the ratio of New York is 49.9%, which is exceedingly higher than other hub cities in the world, the ratio of Seoul is in some aspect very similar to New York on the house scale and the height.

On the other hand, Seoul shows dramatic increase in the ratio of aged householders and thus it is judged that Seoul can take advantage of the know-how on the maintenance of houses of aged households of New York that has settled into the aged society.

In addition, as the significant number of apartment houses in Korea are within 20 years from construction, they require large scale repairs on exterior walls, shared facilities, electrical equipments, piping, etc. Thus, the maintenance system of New York like loan program for the remodeling and renovation of houses for a long term use is considered to offer significant suggestions to Korea.

Therefore, it is determined that the direction of the establishment for the apartment house maintenance loan programs in Korea can be proposed in reference to the loan programs of New York that comprehends vast house stocks, evolution to high-rise, maintenance experiences, various ethnic groups and preferences.

2.2. Apartment houses maintenance policies of Korea and U.S.

To find out the apartment houses maintenance execution direction and importance degree of each city, the maintenance portion and loan program execution status among house master plans of Korea and New York were analyzed, and the status and deficiencies of the apartment houses maintenance in Korea were reviewed.

2.2.1. U.S.

In the U.S., finances for houses are done by private financial organizations, and the government has supported acquisition of houses through the measure of preference, such as government guaranty and interests income deduction for housing loan borrowers. Housing finances are classified into public housing finance and private housing finance. Public housing finances are not in the form of direct supports of fund by the government, but are offered by loan financial organizations to low income classes with low credit points in short of fund through Federal Housing Administration (FHA) and Veterans Administration (VA) in forms of guaranteeing payment for house loan funds.

Private housing finances are classified into qualified loans and non-qualified loans.

Qualified loan means loans satisfying the guidelines for the loan approval by financial organizations, and non-qualified loan indicates loans of a low credit condition [23].

Housing mortgage loan organizations that serve on such housing finance include savings and loan associations, mutual saving banks, commercial banks, life insurance companies, mortgage banks, etc. Saving and loan associations, mutual saving banks, and commercial banks organize loan funds by gathering deposits from retail financial market. Mortgage banks do not treat deposits but organize loan fund by borrowing fund from banks, funding by turning funds into securities, and execute loan on the conditions of sale in the secondary market fundamentally. The ratios of mortgage loans by loaning organizations are 70% by mortgage loan companies, 19% by saving and loan associations and mutual saving banks, and 10% by commercial banks [24].

The housing finances of the U.S. are divided into primary market, secondary market, and capital market. Primary housing finance market, which facilitates direct transaction between housing finance users and housing financial organizations, is composed of housing fund users, housing financial treatment organizations, and housing finance credit complementing organizations. Secondary housing finance market is a distribution market that facilitates sale and purchase of mortgage issued in primary housing finance market through conversion to security, and includes liquefying intermediary organizations that serve as links with capital market [25].

The credit complementing organizations of the U.S. include Federal Housing Administration (FHA) and Veterans Administration (VA).

FHA provides a guaranty service mostly for classes that have difficulties in getting loans of housing fund like mid-low income class or those who purchase houses for the first time. VA executes the guaranty work for the support of discharged veterans in preparing houses.

The liquefying organizations of the U.S. are purchasing the loan bonds complemented of credits by public guaranty and insurance like FHA and VA in priority, and otherwise, require a private mortgage insurance. Such mortgage insurance systems support low income class of low credit with insufficient fund in owing houses by inducing an active participation in mortgage loans through minimizing loss by debt default of borrowers and by minimizing down-payment and alleviating loan requirements for borrowers.

The liquefying intermediary organizations of the U.S. include Ginnie Mac, a governmental organization, and Fannie Mac and Freddie Mac, governmental affiliated organizations. Such organizations serve to promote inducement of long term funds into housing finance market by linking mortgages to capital market by liquefying them [26].

Also, in case creditor becomes insolvent, loan restoring is pursued through sale of house and the collateral value of house becomes important. Therefore, loan for building with low collateral value becomes difficult, even if the building is newly constructed. However, if collateral value is sufficient even in case of existing house, loan amount can be high regardless of aging [27].

Due to such background, in the U.S., there are active financings for the remodeling and renovation for the sustenance of collateral value and guarantee of financing for house maintenance is done by FHA, a government organization, or FHLMC, a quasi-government organization. In the case of New York, if an applicant desiring repair maintenance meets applicable requirements, loan is offered by private banks through the guarantee by the city, or through direct funding by the federal governments [28].

On the other hand, the house related master plans of New York city include 2006–2009 Strategic Plans of the department of buildings (hereinafter DOB), the New Housing Marketplace-Creating Housing for Next Generation (2004–2013) by the New York City Department of Housing Preservation and Development (hereinafter, HPD).

The 2006–2009 strategic plan of DOB is a plan that utilizes cutting edge technologies like IT system, which is characteristic of complex city, and seeks for building safety, work efficiency, citizen service improvement, etc.

The New Housing Marketplace-Creating Housing for Next Generation (2004–2013) by HDP and the New Housing Marketplace-Progress Report 2005 are plans establishment as a countermeasure for the shortage of houses that will occur later on in New York city through new construction of houses and existing houses.

In particular, in view of the fund allotment of Table 6 the New Housing Marketplace-Creating Housing for Next Generation (2004–2013, hereinafter "Houses 10 years plan") reported the portions of investments by types. The new construction was 35.2% and

Table 6
The New Housing Marketplace-Creating Housing for Next Generation (unit: thousand dollars).

Class	Investment amount
New construction	35.2%
Self owned house	$358,000
Leased house	$2,290,000
Sub-total	$2,648,000
Recycling of existing houses	36.9%
Self owned house	$92,000
Leased house	$2,685,000
Sub-total	$2,777,000
Support housing	11.1%
	$832,000
Expense budget	16.8%
House desertion countermeasures, house education, etc.	$1,264,000
Total	$7,521,000

Source: The New Housing Marketplace-Creating Housing for The Next Generation 2004–2013.

there cycling of existing houses was 36.9%. Supportive houses and other ordinary budget were 11.8% and 16.8%, respectively. The budget distribution tells that they are more active in the activities for recycling houses than new construction.

As for funding plan, New York city's internal budget is about 5.8 billion dollars (77.6%) among the entire budget (7.5 billion dollars), New York City Housing Development Corporation (NYCHDC) and the private funds are about 0.55 billion dollars (7.3%) and about 1.1 billion dollars (15.1%), respectively. The majority of budgets are appropriated with New York city's internal budget and private budgets.

In addition, in the case of 2006–2009 Strategic Plan, safety and work efficiency for new construction and existing building management were significantly reinforced through development of building information management systems and web-based procedures, such as elevator inspection record, piping inspection, violation, application, approval, etc. The New Housing Marketplace emphasizes development of loan and fund programs for the promotion of house recycling and offering of new incentives for smooth repair and maintenance of buildings [20,29,30]. The house master plan of New York is as shown in Table 7.

2.2.2. Korea

The government supported loan programs in Korea were shown very poor except for the loans that can be offered generally by commercial financial organizations.

According to the interview survey with the city of Seoul, there is no current policy for apartment house maintenance financial support and later execution strategy, and no financial support is available even for private apartment houses, which are aged or whose safety is intimidated. However, the supports are offered only for public facilities, such as children's play facilities, floor sand and sidewalk block replacement, etc., within general apartment houses. Also, the portion of remodeling is 10% while reconstruction is 90%, which is conducted by management cooperatives of each apartment house. It is because eligible conditions for reconstruction become stricter, remodeling is chosen only as the second preferred option.

The result of interviews (2008) with Korean Ministry of Land, Transport and Maritime Affairs indicated that there is no policy for maintenance financial supports. In other words, even if the supports can be offered for apartment houses according to the article 43 of housing act, the supports are limited to playgrounds, senior centers, sidewalk block replacements, etc., and are not directly related to the maintenance of apartment houses.

Korea Housing Finance Corporation, an organization that guarantees loan money when house lease or purchase fund are loaned from commercial banks, was not directly related with the financial support for apartment house maintenance. However, they operate an improvement fund guaranty program for the guarantee of loans from commercial banks. However the effectiveness was very negligible because there were only 4 cases for 48 million won in 2007.

Korea Land & Housing Corporation supports on improvement of the outside environments, such as painting, wallpapering, play ground, etc., only for the public leased apartment houses managing by the corporation according to the residential environment improvement project. There is however no supporting to the private apartment houses.

According to the ratios of the apartment house maintenance in Korea, the amount of apartment house maintenance contract was about 280 billion won [31], which is equivalent to 0.69% of 37,600 billion won (2009) [32] of the construction investment amount. It implies that the investments on private or governmental maintenance were very negligible.

In summary of the housing policy master plan discussed so far in Table 8, the secondary basic plan for facility safety and maintenance has been conducted with emphasis on improvement of safety and maintenance system, improvement of safety management system tuned basically for the advancement of safety and maintenance organization/engineers, improvement of repair and reinforcement system, and establishment of preventive maintenance system [33–35].

Housing General Plan (2003–2012) in Korea declares the development of technique for the performance reinforcement of existing house, construction of variable type houses that can be reformed or remodeled easily, and support for the activation of house remodeling as focused objective of maintenance field. Seoul city housing general plan focuses on the maintenance of the extension of existing house lifecycle and management of safety by aging as the number of super-high apartment houses is increased among existing houses.

In summary, the housing master plans of Seoul city and the Korean Ministry of Land, Transport and Maritime Affairs are executing in order to construct the variable type houses that can be remodeled or renovated easily and extend apartment house lifecycle. However it turned out the social conditions and the detailed plans for the active execution of apartment maintenance policies are insufficient [36].

2.2.3. Summarized opinion

In the U.S., housing finances for house purchase and maintenance have been generalized since long before. Especially, the U.S. government has offered the systems to provide fund loans seamlessly to individuals whose fund is insufficient through the strong housing finance guarantee system to complement personal credit.

In addition, the housing master plan of New York has invested significantly in the recycling of houses rather than new construction, which is anticipated to be highly effective in solving house shortage, boosting economy, and creating employment through maintenance and recycling of existing houses.

In Korea, as apartment houses occupy about 52% among the entire houses, apartment houses take up a very important position in residential life. Also, since the apartment houses in the first group of new cities, such as Bundang, Ilsan, and Seoul, have been 20 years since they were constructed, it is becoming high time to execute maintenance of apartment houses in earnest and now is a moment in need of discussion how such houses can be maintained sustainably.

However, the government and the academic circles have not paid efforts enough to make the systems practical, such as the gov-

Table 7
Maintenance related plan among the house related master plan of New York city.

Item	2006–2009 strategic plan	The New Housing Marketplace-Creating Housing for Next Generation (2004–2013)	The New Housing Marketplace-Progress Report 2005
Objective	Prevent decay, maintain integrity and safety improve and service quality based on technology and professionalism	Supply affordable houses through new construction and recycling of existing houses	Supply affordable houses additionally
Planned period	2006–2009	2004–2013	2005–
Executing organization	DOB of New York city	HPD of New York city	HPD of New York city
Planned contents	Promote construction and acquire safety provision Prevent government personnel corruption Construction and maintenance with the use of IT Foster experts	Search for new housing land for the supply of affordable houses Develop incentives for house construction Induce private funds for the construction of affordable houses Promote remodeling of public houses	New construction Use city owned land for house supply Supply affordable houses through large scale development Preservation Develop loan and fund programs to promote recycling Offer new incentives for building repair and maintenance
Maintenance contents	Develop building information management system through internet Manage elevator inspection records, piping inspection, application and approval via internet Strengthen safety inspection	Offer loans and funds (about 2.8 billion dollars) for the recycling of existing affordable houses	Develop loan programs to promote recycling Offer new incentives for building repair and maintenance Develop new strategy for aged building

Table 8
Maintenance related plan among the house related master plan in Korea.

Item	Secondary facility safety and maintenance basic plan	Housing general plan (2003–2012)	Seoul housing general plan (2003–2012)
Objective	Realize no accident of the facility, prevent defect, and improve facility safety condition	Fundamentally solve house defect problem Stabilize housing market Improve nationals residential standard	Stabilize Seoul's housing market and improve the residential wellbeing of low income households
Planned period	2007–2012 (5 years)	2003–2012 (10 years)	2003–2012 (10 years)
Executing organization	Korean ministry of land, transport and maritime affairs	Korean ministry of land, transport and maritime affairs	City of Seoul
Planned contents	Improve safety management system Improve repair/reinforcement system Enhance technical power of facility managing subject Induce ejection of defective business and foster excellent business Improve the technical level of safety and maintenance technicians Establish preventive maintenance system Manage the safety of facility by utilizing ubiquitous technology	Supply houses sustainably through housing market to meet various local housing market needs Maintain housing market stability by restricting speculative demands Utilize house stocks efficiently Reinforce public housing policy for the residential stability of low income class	Reinforce the residential wellness of low income households to meet social equity. Acquire high quality house stocks Maintain nearby environment with emphasis on sustainability and living quality Specialize apartment houses maintenance system to acquire stability
Maintenance contents	Same as above	Develop technique for performance reinforcement of existing houses Construct variable type houses that can be reformed or remodeled easily Support for the activation of house remodeling	Promote extension of apartment houses lifecycle Rationalize business administration and management

ernment guaranty and preparation of fund required for financial support through research on foreign financial system to implement sustainable maintenance of apartment houses and public financial programs.

As policy direction changes from house production centered plan to green policy like recycling of existing houses, long term fixed low interests rate loans should be supplied to cover public financial roles where commercial financial organizations can have difficulty.

Therefore, the Section 3 intends to seek for the direction for the establishment of the apartment house maintenance loan programs in Korea later on by identifying the loan programs of New York City.

3. Loan programs of New York

The loan programs of New York are operated so that funds are offered at low interests rate with part of the interests are undertaken by New York City. The loan programs of New York City can be divided into the Participation Loan Program, New Partners Programs, The Small Buildings Loan Program, Home Improvement Program, Rehabilitation New Partners Program, Article 8A Loan Program, Supportive Housing Loan Program, Primary Prevention Program, and Senior Citizen Home Assistance Program. The loan programs of New York are mainly intended for small apartment houses, low income individuals, and aged and disabled [37–48].

3.1. Subjects of loan programs

In the case of New York, loan programs mainly support small buildings of one to twenty households, composite buildings with vacancy, and buildings with insufficient residential environments. The Participation Loan Program is intended for internal regeneration of composite buildings with more 20 households. New Partners Program is for internal regeneration of residential and commercial buildings with vacancies of one to twenty households. The Small Buildings Loan Program focuses on proper repairs and internal renovations of buildings with one to twenty households or buildings whose 50% is residential.

Home Improvement Program is for buildings with insufficient environments requiring replacement or repair of bricks, rooftops, pipes, boilers and electric wirings. Rehabilitation New Partners Program covers small buildings of four or less households and buildings of poor residential environments of twenty or less vacancies.

Also, Supportive Housing Loan Program supports regeneration of buildings that accommodate the aged and homeless. Senior Citizen Home Assistance Program is intended for the regeneration of buildings of the threescore who leases out to one to three households while the aged he/she is residing in his/her own house. The subjects of loan programs summed up are as in Table 9.

3.2. Preference contents of loan programs

In general the preference contents of the loan programs of New York support parts of the interests so that the interest rates shall be up to 1–3% for ten to thirty years and 10,000–40,000 dollars are funded. In addition, real estate taxes are deduced or exempted for a few financial programs.

The Participation Loan Program supports 10,000 dollars per household for maximum 30 years at 1% interest rate, and the exemption of real estate tax called J-51 is also supported. New Partners Programs covers maximum 40,000 dollars per household at a low interest rate. The Small Buildings Loan Program provides the benefit of real estate exemption like J-51 and 421-b at 1% interest rate for maximum 30 years. Home Improvement Program supports 30,000 dollars for maximum 10 years at 2.5–5% interest rates depending on the income level.

Table 9
Subjects of loan programs.

Program name	Contents
The Participation Loan Program	Composite buildings of 20+ households
New Partners Programs	Buildings with 1–20 households vacancy among buildings that are occupied in commercial activity like store, etc.
The Small Buildings Loan Program	Buildings of 1–20 households among buildings of insufficient environment
Home Improvement Program	Buildings with insufficient environment requiring exchange and repair of brick, rooftop, piping, boiler and electric wiring
Rehabilitation New Partners Program	Buildings where 1–4 households are living or buildings with 1–20 households vacancy
Article 8A Loan Program	Buildings whose piping, heating system, glass, bricks and electric equipments, etc. are worn out.
Supportive Housing Loan Program	Buildings that accommodate disabled and homeless, etc.
Senior Citizen Home Assistance Program	Houses of aged 1–3 households of which are leased out while the aged the owner of the house is residing personally

Rehabilitation New Partners Program supports 15,000 dollars per household for maximum 30 years. In the case of Article 8A Loan Program, 35,000 dollars per household, which are eligible for exemption of real estate tax, are supported at 3% interest rate for 30 years.

Supportive Housing Loan Program, which is intended for the disabled and homeless, supports 90,000 dollars per household for maximum 30 years. If the entity of non-profit organization complies with the regulation on low income people, the homeless, or the disabled, etc. for 30 years, redemption of the principal and the interest is exempted. In addition, in Senior Citizen Home Assistance Program, 30,000–40,000 dollars are supported at 0–3% interest rates depending on the age. The preference contents of loan programs can be summarized as shown in Table 10.

Table 10
Preference contents of loan program.

Program name	Contents
The Participation Loan Program	10,000 dollars per household is supported for maximum 30 years at 1% interests rate. Associated with real estate tax exemption programs like J-51, etc.
New Partners Programs	Maximum 40,000 dollars per household is supported for 30 years
The Small Buildings Loan Program	1% interests rate for maximum 30 years Associated with real estate tax exemption program like J-51 and 421-b, etc.
Home Improvement Program	Maximum 30,000 dollars is supported at 2.5–5% interests rate for 30 years depending on income level.
Rehabilitation New Partners Program	15,000 dollars per household is loaned for maximum 30 years at low interests rate.
Article 8A Loan Program	35,000 dollars per household is loaned at 3% interests rate for 30 years Eligible for fixed property tax exemption
Supportive Housing Loan Program	90,000 dollars per household is loaned for 30 years
Senior Citizen Home Assistance Program	30,000–40,000 dollars is loaned at 0–3% interests rate

Table 11
Application requirements of loan programs.

Program name	Contents
The Participation Loan Program	Agreement of rent stabilization system
New Partners Programs	Agreement of rent stabilization system
The Small Buildings Loan Program	Agreement of rent stabilization system Donate 2–10% of project cost
Home Improvement Program	None
Rehabilitation New Partners Program	Agreement of rent stabilization system
Article 8A Loan Program	None
Supportive Housing Loan Program	None
Senior Citizen Home Assistance Program	None

3.3. Application requirements of loan program

In New York, no particular application requirement applies as long as the conditions of subjects of the financial program are met. Some programs require an agreement that they are willing to be controlled by the NYC Rent Stabilization system. The Participation Loan Program, New Partners Programs, The Small Buildings Loan Program, and Rehabilitation New Partners Program require the agreement that they will be subject to the control of rent stabilization system, but Home Improvement Program, Article 8A Loan Program and Supportive Housing Loan Program require no particular condition. The application requirements of loan programs can be summed up as in Table 11.

3.4. Preference conditions of loan programs

In New York, loan program applicants are subject to the control of NYC Rent Stabilization System[4] if they are benefiting from financial program except for programs for aged and disabled, but some programs donate a part of the project cost. New Partners Program requires being controlled by Rent Stabilization System, while individuals who are seeking profits shall donate 10% for project costs and those seeking non-profit 2%.

The Small Buildings Loan Program also requires donating 2–10% under the control of the rent stabilization system. In the case of Rehabilitation New Partners Program, beneficiaries are also subject to the control of NYC Rent Stabilization System.

Article 8A Loan Program maintains the limitation on buildings of low income residents. Programs for the aged and disabled include no particular conditions. The preference contents of loan programs are summarized as shown in Table 12.

3.5. General analysis

In this section, the subjects, preference contents, application requirements and preference conditions of the nine loan programs discussed above were summarized in order to provide the directions of application of the programs in Korea.

The subjects of loan programs of New York can be divided into three parts; general renovation, poor residential environment, and socially disadvantaged like the aged. In New York, for there are so many houses which are in relatively poor conditions due to a multitude of immigrants and multi-ethnic people, the loan programs mainly support small buildings of 20 or less households, composite buildings with vacancy, and buildings whose residential environments are insufficient.

Preference contents include the coordination of house renovation funds, interests of subsidy, and tax preference. In other words, the long-term funds of max 30 year-term are financed to general citizens, such as small apartment houses, low income individuals, etc., and disabled or homeless, benefits are offered in association with tax exemption or deduction program.

As for application requirements, no particular conditions are applied in New York, and regarding preference conditions, the loan programs of New York City reflect the characteristics of a big city that has enormous private rent houses. For example, the rent stabilization system of the city controls the upper limit of rent while the city supports the fund. The loan beneficiaries are required to donate 2–10% of project cost (Table 13).

[4] The Rent Guidelines Boards of New York city is restricting increase rate each year for rents.

Table 12
Preference conditions of loan program.

Program name	Contents
The Participation Loan Program	Controlled by New York rent stabilizing system
New Partners Programs	Controlled by New York rent stabilizing system Individual seeking profit shall donate 10% of project cost and those seeking no profit 2%.
The Small Buildings Loan Program	Controlled by New York rent stabilizing system Donate 2–10% of project cost
Home Improvement Program	None
Rehabilitation New Partners Program	Explains the validity that building owner shall benefit from loan program Controlled by New York rent stabilizing system
Article 8A Loan Program	Limited to buildings inhabited by low income resident
Supportive Housing Loan Program	None
Senior Citizen Home Assistance Program	None

4. Proposal of the apartment house maintenance loan programs in Korea

In this section, the direction of the apartment house maintenance loan programs in Korea was proposed based on the analysis of its characteristics of the loan programs in New York that was reviewed in Section 3.

For the proposal, the opinions of experts were gathered through interviews with the governmental organizations, such as the Korean Ministry of Land, Transport and Maritime Affairs, the City of Seoul, Korea Housing Finance Corporation, Korea Land & Housing Corporation, and other relevant research institutes. Based on the

Table 13
Loan program system of New York.

Class	Loan Programs in New York
Major subjects	Small buildings of 1–20 households Composite buildings with vacancy Aged and disabled
Preference contents	Fund loan (30 years) + subsidy of part of interests + tax reduction or exemption
Qualifications for application	No particular application requirement applies for building owner with sufficient redemption capability
Preference conditions	Subject to the control of New York rent stabilization system Shall donate 2–10% of project cost

Table 14
Loan programs (proposal) in Korea.

Class	Loan Programs in Korea
Major subjects	Aged or disabled (priority) Houses with poor residential environment Houses requiring renovation
Preference contents	Coordination of funds from private bank and subsidy (in priority) of interests Loan directly and subsidy of part of the interests from the city For guarantee, Korea housing finance corporation or particular organization shall be specified as committed organization. Support of guarantee fee as subsidy may also be considered.
Qualifications for application	Opinions, agreement and debt guarantee of management cooperative are required.
Preference conditions	No conditions are required to induce maintenance, but specific condition may be added depending on policy executing direction.

opinions and analyses, the ideas that can be applied in Korea were deduced and reflected in the proposal.

4.1. Proposal of the direction for loan programs

In New York, the priority of loan programs are in the order of houses that require renovation, houses with poor residential environments and the aged and disabled, while the City of Seoul sets the order of subjects as the aged, apartment houses with poor residential environments, and houses that require renovation. In Korea, the rate of increase of the aged is the highest among the OECD member countries [49], thus, the aged is considered as the top priority of loan programs. Also, since Seoul is high in house price in the world, the low income class or socially disadvantaged class that is in poor residential environments have less options. It implies that there are severe threats of residential safety. Thus the houses in poor residential environments also were considered as subjects. For houses required general renovation, the resources that government owns are limited, thus fund limitations were also applied.

Furthermore, about 80% of the apartment houses in Korea are those within 20 years from the construction, so it needs to be considered that developing loan programs in order to support the repair of equipments, piping, finishing materials like exterior wall and tiles, etc.

As for the preference contents, for the resources of the government are limited, the other resources from the private banks and subsidies of interests can be considered rather than direct supports by the administrative organizations. However, in case if serious problems exist regarding safety or residential environments, a direct funding from the city may also be considered. As for the interest subsidy, the interest rate should be low within the limit. In particular, in case of the aged or the disabled, more subsidies of interests shall be offered.

In the meantime, as for the guarantee of fund borrowed from private banks, the guarantee in association with Korea Housing Finance Corporation, a governmental or the method of committing the work to particular organizations may be also considered. The incentives, such as the simplification of application requirements and process and subsidies of interests, should be considered. In addition, it can be considered to provide the fee for guarantee as subsidy.

As for the application requirements, the agreements and debt guarantee by the management cooperation are required, and regarding preference conditions, no conditions are placed to induce maintenance. However the conditions may be specified according to the government policies (Table 14).

4.2. The activation plan of apartment house maintenance finance

Since Korea has no governmental supporting experiences of executing house maintenance finance, house maintenance financing is still at the beginning stage. The mid-low income class and the aged, which are the majority of population, are not capable enough, so the government needs to keep the seamless support of fund for them.

Here, the activation plan of the activation of maintenance finance in Korea was proposed as follows based on the analysis of the maintenance loan program system in the U.S.

First, for the complementation of individual credit risk, loans from private banks shall be made smoothly through the reliable guarantees of the government or the governmental organizations as in the case of the U.S., and the partial subsidy from the government or the municipality is required for loan interests.

Through the government payment guarantee system and alleviation of loan requirements borrowers can have minimized initial equity ratio. Thus, the system that can support citizens who are in the situation of insufficient fund needs to be established.

Such system is found also in Japan where support systems of housing finance are established through coordination of funds from private banks. The guarantee is undertaken by the mansion management center of Japanese of land, infrastructure, transport and tourism.

Also in Korea, Korea Housing Finance Corporation conducts the guarantee work, but due to lack of public relations and strict loan requirements, the number of cases using the system is very negligent. Thus incentives like the interest subsidy, etc. are required along with simplifying requirements and specific strategies need be prepared for the development and activation of various maintenance financing programs.

In particular, getting loan from private banks is difficult for houses inhabited by the disabled, the aged and no parent families who are incapable of making living, direct financing or prior support of subsidy by government is required for such case.

Second, the activation of housing finance through tax deduction for the loan utilized in maintenance, such as remodeling and renovation, can be also reviewed. In the U.S., the economic recovery was attempted [50] through the activation of housing finance program after the Great Depression in the 1930s, and also in Europe, such activation of house maintenance was utilized for boosting of economy like activation of local economy through many cases [51].

Also, in Korea, when about 80% (about 9.9 million households nationwide and 1.8 million households in Seoul) of apartment houses are within 20 years of age, housing finance for maintenance is activated in order to produce significant positive effects in boosting economy and creating employment.

Third, in order that administrative organizations may support financing actively, foundations need be prepared through revision of the housing act. So far, limitations existed in the support due to absence of clear provision of foundation for financial support. Therefore, in order for administrative organizations to actively support maintenance finance, article 43 management entity, etc. of the housing act needs be revised as shown in Table 15. Such revision is anticipated to enable municipalities and administrative organizations to support subsidy or tax deduction for the financing interests required for the remodeling or renovation of apartment houses.

Fourth, fund source for apartment house maintenance needs be prepared.

As shown in the example of the fund allotment in the New Housing Marketplace-Creating Housing for Next Generation (2004–2013 hereinafter “Housing 10 years plan”) of New York, planned funds are composed of New York City’s internal budget, relevant organization funds and private funds. In the case of the internal budget of New York City that takes up the greatest por-

Table 15
Revision of housing act.

Before revision	After revision
Article 43 of housing act: Head of municipality may support part of the cost required for apartment house managing entity to execute the work of managing apartment house as specified by the municipal ordinance of that municipality.	Article 43 of housing act: Head of municipality may support the cost required for apartment house managing entity to execute the work of managing apartment house and maintenance activities like remodeling and renovation and take proper measure as specified by the municipal ordinance of municipality.

tion, the fund may be significantly affected by economic changes, so sustainable fund sources are required. Here, the plan for the preparation of fund sources in fund stability and sustainability can be proposed as follows:

(a) The first plan is to raise fund from certain portion about 1% of construction cost in new construction, and utilize it as loan or subsidy required for maintenance. The fund raised in that process is judged capable to be utilized as fund required for stable maintenance. In France, such raised funds are used as a major source of city regeneration program, and 1% of housing fund induced of investment of about 5 billion Euros [52].
(b) The second plan is to utilize a national housing fund. Presently, the national housing fund is being utilized as loans for sale-based and rented house construction and lease fund and house purchasing fund. National housing fund, 27 trillion 700 billion won (as of 2010), is very public in nature, so if 1% or so, which is equivalent to about 270 billion won, are supported in the form of loan or subsidy to classes requiring absolute support by the government like the aged and the disabled, significant policy effects will be produced in creating welfare and employment.

Fifth, a specialized organization that can monitor financial supports and develop policies in detail is required.

In Korea, since there is virtually no experience in financial support for maintenance, it is necessary to specify a particular organization and set up a specialized department to minimize trial-and-errors that may occur in the early stage of execution and maximize its financial service.

5. Conclusions and future study project

So far, a direction for the establishment of the apartment house maintenance loan programs in Korea was proposed through the analysis of the apartment house maintenance loan programs of New York City.

The city of Seoul and the large new cities near Seoul just passed about 20 years since construction, and thus are at a time point for full scale discussion of maintenance.

Through the study of the establishment of loan programs in Korea, the following conclusions were made:

First, based on the apartment house maintenance environment and housing financing policy that U.S. and New York City have experienced, the apartment house maintenance environment and policies in Korea were examined, and subsequently the validity and deficiency of the apartment house maintenance in Korea were identified.

Second, the framework of the loan programs in New York City were identified through the analysis of the subjects of the apartment house maintenance loan program, preference contents, application conditions, and preference conditions in New York.

Third, based on the framework of the loan programs in New York, a plan for the activation of the house maintenance financing programs in Korea, which are still at beginning stage, was proposed according to the proposed direction for the loan programs in Korea.

The direction of the establishment of apartment house maintenance financing program proposed in this paper is benchmarked from the U.S. financing program where relevant researches and recognition on the apartment house maintenance financing program in Korea are insufficient, but yet the house maintenance financing programs in Europe and Japan also are judged necessary to be surveyed.

In addition, there needs be test projects to minimize trial-and-error of financing program proposed in this paper. It is determined that the further study must be done on a specific funding strategies and the scale estimation of financing programs in Korea, the government guaranty and composition of specialized organizations through test projects. Such further studies are anticipated to serve as an opportunity to promote apartment house maintenances in Korea.

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